

(51) International Patent Classification⁵ :

E03D 9/03

A1

(11) International Publication Number:

WO 92/20876

(43) International Publication Date:

26 November 1992 (26.11.92)

(21) International Application Number: PCT/GB92/00896

(22) International Filing Date: 18 May 1992 (18.05.92)

(30) Priority data:

9110746.6

17 May 1991 (17.05.91)

GB

(71) Applicant (for all designated States except US): BROOK-
LINE ALPHA LIMITED [GB/GB]; 10 Robert Eliot
Centre, 1 Old Nichol Street, London E2 7HR (GB).

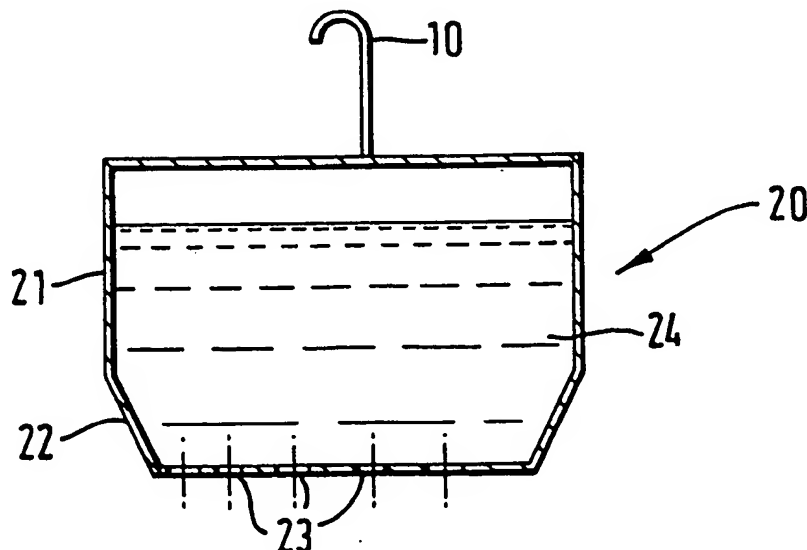
(72) Inventor; and

(75) Inventor/Applicant (for US only): DAVIS, Raymond, Chris-
topher [GB/GB]; 21 Cassland Road, London E2 7AL
(GB).(74) Agent: WILLIAMS, POWELL & ASSOCIATES; 34 Ta-
vistock Street, London WC2E 7PB (GB).(81) Designated States: AT (European patent), AU, BE (Euro-
pean patent), CA, CH (European patent), DE (Euro-
pean patent), DK (European patent), ES (European pa-
tent), FI, FR (European patent), GB (European patent),
GR (European patent), IT (European patent), JP, LU
(European patent), MC (European patent), NL (Euro-
pean patent), NO, SE (European patent), US.

Published

With international search report.

(54) Title: RELEASE DEVICE



(57) Abstract

A release device for a lavatory or the like comprises a perforated container (20) filled with a gel (24) that is suspended in the lavatory pan. As water flows over the container (20) some of the gel (24) is dissolved, through the perforations (23).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FI	Finland	MI	Mali
AU	Australia	FR	France	MN	Mongolia
BB	Barbados	GA	Gabon	MR	Mauritania
BE	Belgium	GB	United Kingdom	MW	Malawi
BF	Burkina Faso	GN	Guinea	NI	Netherlands
BG	Bulgaria	GR	Greece	NO	Norway
BJ	Benin	HU	Hungary	PL	Poland
BR	Brazil	IE	Ireland	RO	Romania
CA	Canada	IT	Italy	RU	Russian Federation
CF	Central African Republic	JP	Japan	SD	Sudan
CG	Congo	KP	Democratic People's Republic of Korea	SE	Sweden
CH	Switzerland	KR	Republic of Korea	SN	Senegal
CI	Côte d'Ivoire	LI	Liechtenstein	SU	Soviet Union
CM	Cameroon	LK	Sri Lanka	TD	Chad
CS	Czechoslovakia	LU	Luxembourg	TG	Togo
DE	Germany	MC	Monaco	US	United States of America
DK	Denmark	MG	Madagascar		
ES	Spain				

Release Device

The present invention relates to release devices, and more particularly to devices for releasing a substance
5 into a body of liquid.

A known release device for releasing a disinfectant or the like into a lavatory bowl comprises a plastics cage containing a block of solid disinfectant which is
10 suspended against the side of the bowl. When the lavatory is flushed, water passes through the cage and dissolves some of the disinfectant. However, the amount of disinfectant dissolved with every flush decreases with the age of the block, as its surface area
15 decreases. Also, specialised equipment is required to manufacture devices of this type.

The present invention seeks to provide a release device that releases a substance into a body of liquid at a
20 substantially constant rate throughout its life. The invention further seeks to provide a release device which is simple to manufacture using standard machinery.

According to a first aspect of the invention there is
25 provided a release device comprising a container at least partially filled with a fluent substance, wherein the container allows contact between the fluent substance and a liquid outside the container through at least a portion of the walls of the container, and in
30 use the fluent substance leaves the container by dissolving into the liquid.

In a preferred arrangement, the fluent substance is a gel and the walls of the container include one or more
35 perforations, through which the gel does not by

itself flow under normal conditions of use.

Alternatively, at least a part of the walls of the container is made from a porous material.

5

Preferably, the container substantially comprises an elongate cylinder. The cylinder may be elliptical in cross section. The container may be divided by two partitions extending longitudinally through the container. The longitudinal axis of the cylinder may be curved.

10

Preferably, the device further comprises suspension means to suspend the device from an object. The perforations may be arranged opposite the suspension means.

15

Preferably, the perforations are arranged in a substantially rectangular wall forming a part of the container, formed in the lower part of said elongate cylinder. The perforations can be formed in a cap which closes an opening in said wall.

20

Preferably, detachable closure means are provided to close the perforations. The closure means may comprise a tear-off or snap-off strip.

25

Preferably, the device is formed to hang from the rim of a lavatory pan and rest against the bowl thereof. The device may contain one or more of the following substances: a detergent, a colouring agent, a perfume, a biocide, bleach, or an insecticide.

30

According to a second aspect of the invention there is provided a method of releasing a fluent substance into a

35

body of liquid, the method comprising the steps of:
filling a perforated container with the fluent
substance, the properties of the fluent
substance being such that the substance does not flow by
5 itself through the perforations, and suspending the
container in said body of liquid.

According to a third aspect of the invention there is
provided an apparatus comprising a flowing stream of a
10 liquid contained by containment means, and a container
at least partially submerged in said stream, wherein the
container is at least partially filled with a fluent
substance and allows contact between the substance and
the liquid through at least a portion of the wall of the
15 container, and in use the fluent substance leaves the
container by dissolving into the liquid.

In a preferred arrangement the containment means is a
lavatory bowl and the liquid is water.

20 In order that the invention and its various other
features may be understood more easily, embodiments
thereof will now be described by way of example only,
with reference to the drawings, wherein:-

25 Fig. 1 is a sectional view along 1-1 in Fig. 2 of a
release device according to a first embodiment of the
invention;

30 Fig. 2 is a plan view of the device shown in Fig.1;

Fig. 3 is a side view of a release device according to a
second embodiment of the invention;

35 Fig. 4 is a detail underneath plan view of the cap

member of the device shown in Fig. 3;

Figs. 5 and 6 are perspective views of a third and fourth embodiment of the invention;

5

Fig. 7 is a side elevation of a fifth embodiment of the invention;

Fig. 8 is a view in direction 8 in Fig. 7;

10

Fig. 9 is a section on 9-9 in Fig. 7; and

Fig. 10 is an underneath plan view of a cap comprising a part of the embodiment shown in Fig. 7.

15

The release device shown in Fig. 1 comprises a hook member 10 and a container 20.

The container 20 comprises a cylindrical portion 21 and a trapezoid portion 22. In the floor of the trapezoid portion there are a plurality of perforations 23. The diameter of the perforations lies between 1mm and 2.4mm. The container contains a gel 24. The gel may comprise a detergent, a colouring agent, a perfume, a biocide, bleach and/or an insecticide in a suitable carrier substance. Suitable carrier substances are composed of natural gums and a cellulosic gel. The properties of the gel are such that it cannot flow through the perforations under normal conditions of use.

30

The container is divided by two longitudinal partitions 25, 26. The partitions extend adjacent to one another along the length of the container, dividing it into two compartments 27, 28. The partitions are thinner than the walls of the container.

35

There is a vent (not shown in Figures) in each compartment 27,28 to equalise the pressure inside and outside the container. The hook member 10, the container 20, and the partitions 24,26 are made in a plastics material.

The device is made in two parts. Two mouldings are formed which each correspond to one half of the device when it is bisected by a vertical plane extending along the longitudinal axis.

Each moulding is partially filled with gel 24 and sealed using a layer of thin plastics sealing material. The two halves are then welded together to form the device. The layers of sealing material form the partitions 25,26 within the container 20.

The release device is configured for use in a lavatory bowl. The device is hung on the rim of the bowl by the hook member 10, above the surface of the water in the bowl.

When the lavatory is flushed, water runs down the sides of the bowl and over the device. Some of the water enters the perforations 23 and contacts the gel 24. This dissolves some of the gel and carries it into the lower part of the bowl, where it mixes with the body of water therein. As gel that is adjacent to the perforations is dissolved, more gel flows down the container to replace it. The gel is prevented from flowing through the perforations by surface tension forces and other properties of the fluid such as density and viscosity.

The release device is configured so that the size of the

perforations creates a surface tension force that is sufficient to prevent the gel in the container flowing through the perforations under the effect of gravity.

5 Example

A prototype of the device having 2.4 mm diameter perforations and containing a proprietary brand of shower gel, was found to distribute the gel into flowing
10 water at a steady rate over an extended period.

The device has the advantage that it discharges substantially the same amount of gel 24 into the water with every flush until the gel is exhausted. The device
15 is simple and cheap to produce with standard machinery.

The two part construction of the device makes it easier to fill the container with the viscous gel, as it is difficult to fill the container through small apertures.
20

The shape of the device ensures that it does not protrude excessively into the bowl.

In a modification of the first embodiment of the invention each compartment 27,28 contains a different
25 gel. In another modification, the partitions extend transversely of the device.

In a further modification the container is formed as a
30 single compartment. The container is filled with gel through the perforations. The container is filled under pressure to enable gel to enter the container. Also, the gel may be warmed to reduce its viscosity. The device can be refilled when it is empty.

Fig. 3 shows a second embodiment of the invention. The container is formed as a single compartment. The lower part of the container 30 has a single opening therein. A removable cap 31 fits over the opening to contain the liquid. The cap contains perforations 32 through which water can contact the gel.

The cap 31 allows the container to be easily filled. A range of caps with different sized perforations can be provided for use with a single container.

A further cap can be provided that fits over the perforated cap 31 to seal the container when it is not in use.

Fig. 5 shows a further embodiment of the invention. The container wholly comprises a cylinder with an elliptical cross-section. Rows of perforations (designated 40 but not shown in Fig. 5) are arranged along the lower part of container.

The shape of the container ensures a relatively streamlined flow over the container. This reduces the incidence of dead spots adjacent to the perforations, and enhances mass transfer.

A number of modifications can be made to all of the embodiments of the invention. The container can be curved along its longitudinal axis so that the curvature of the container matches the shape of the lavatory pan.

A closable opening can be provided in the upper part of the container to allow the container to be filled or refilled more easily.

The device can be suspended in the cistern of the lavatory.

5 In addition to, or instead of, the above-described perforations, one or more perforations can be provided in the sides of the container.

10 The shape of the container can be varied to suit the application for the device. Fig 6. shows an alternative configuration of device. Alternatively, the container can comprise a cylinder which is suspended vertically. Further, a conventional bottle shape may be employed.

15 Figs. 7 to 10 show a fifth embodiment of the invention. The container 50 comprises a tank 51 having flanges 52, 53 at its top and bottom. A hole 54 allows the device to be suspended in a lavatory. Decorative markings 55 are applied to the outside of the tank.

20 The device is closed by a threaded cap 60. The roof of the cap contains three perforations 61. Each perforation is formed in the floor of a tapered circular inset 62 in the roof of the cap. The thickness of the cap at the perforation 61 (i.e. the length of perforation) is
25 preselected to match the properties of the gel to be distributed. A downwardly directed ring 63 forms a seal between the cap and the neck of the tank. Three grooves 64 are formed in the periphery of the cap.

30 Prior to use the device is sealed by an overcap 70. This has resiliently deformable keys 71 which engage the grooves 64 in the cap 60. Nipples 73 on the overcap seal the perforations 61.

35 The perforations 23 can be replaced by capillary or

porous wall sections. This allows the surface tension of the gel inside the container to be reduced. The porous wall sections can be made from a semipermeable membrane, a sponge material, a felt, or a suitable ceramic material.

The embodiments shown have rigid walled containers, but flexible walled containers can be used. The container can comprise a flexible, perforated sachet of gel.

The structure of the outside of the container adjacent to the perforations can be configured to produce an area of low pressure on the perforations. This allows some of the gel inside the container to flow out of the perforations and increases the release rate of gel into the water.

After filling, but before use, the device can be sealed by a tear-off foil or plastics strip, stuck over the perforations. A snap-off strip may also be used.

It is emphasised that the use of the device in a lavatory is exemplary only. The device is suitable for applications in any flowing body of liquid. The flow can be intermittent or continuous.

A particular example of an alternative use is in releasing weed killer into waterways. An enlarged release device containing the weed killer in a gel formulation is partially or totally submerged in the upstream section of a canal or river. The device ensures even dosing of the water over a prolonged period.

The device can also be used in an immersed position in

a closed pipe or conduit. In this case, as the gel
flows out of the container, liquid from the outside
flows in through the vents in the upper part of the
container to fill the container. This forms a pool of
5 liquid above the gel.

CLAIMS

1. A release device comprising a container at least partially filled with a fluent substance, wherein the container allows contact between the fluent substance and a liquid outside the container through at least a portion of the walls of the container, and in use the fluent substance leaves the container by dissolving into the liquid.
2. A release device according to claim 1, wherein the container substantially comprises an elongate cylinder.
3. A release device according to claim 2, wherein the cylinder is elliptical in cross section.
4. A release device according to claims 2 or 3, wherein the longitudinal axis of the cylinder is curved.
5. A release device according to any preceding claim, wherein the container is divided by two partitions extending longitudinally therethrough.
6. A release device according to any preceding claim, further comprising suspension means to suspend the device from an object.
7. A release device according to any preceding claim, wherein the fluent substance is a gel and the walls of the container include one or more perforations, through which the gel does not by itself flow under normal conditions of use.
8. A release device according to claims 6 and 7, wherein the perforations are arranged opposite the suspension means.

9. A release device according to claims 7 or 8, wherein the perforations are arranged in a substantially rectangular wall forming part of the container, formed in the lower part of said elongate cylinder.

5

10. A release device according to claim 9, wherein the perforations are formed in a cap which closes an opening in said wall.

10 11. A release device according to any of claims 7 to 10, wherein detachable closure means are provided to close the perforations.

15 12. A release device according to claim 11 wherein the closure means comprises a tear-off or snap-off strip.

20 13. A release device according to any of claims 1 to 6, wherein the fluent substance is a gel and at least a part of the walls of the container is made from a porous material.

25 14. A release device according to any preceding claim, wherein the device is formed to hang from the rim of a lavatory pan and rest against the bowl thereof.

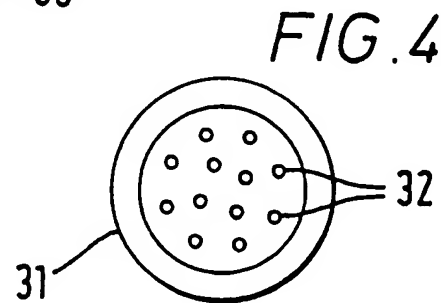
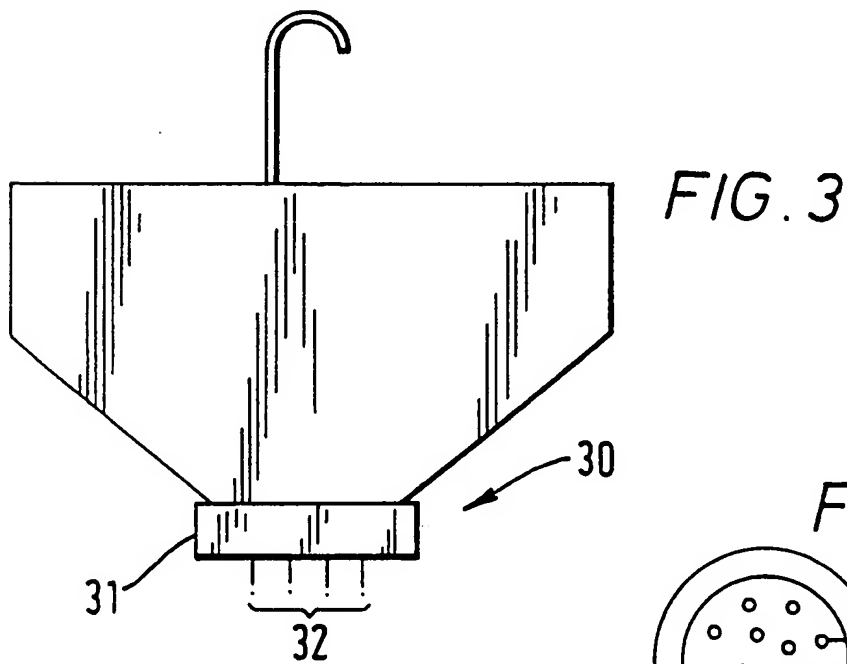
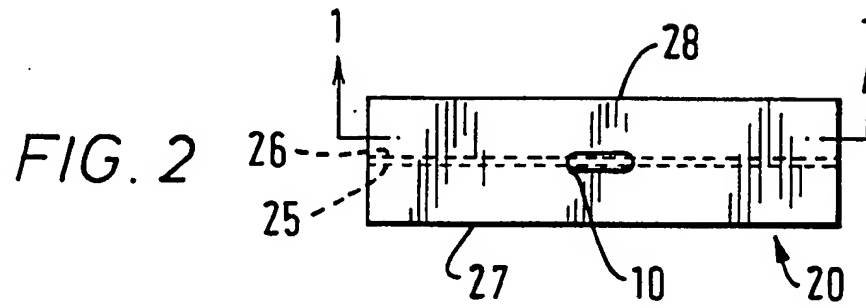
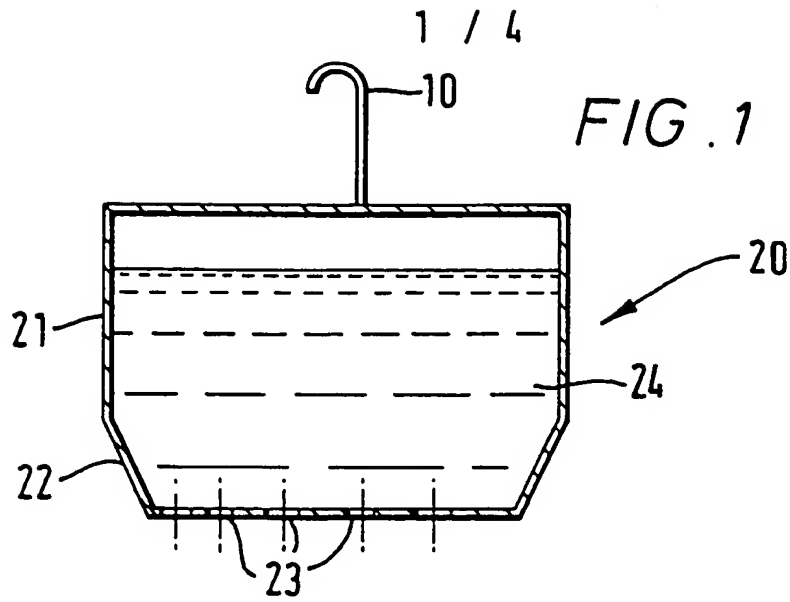
30 15. A release device according to any preceding claim containing one or more of the following substances: a detergent, a colouring agent, a perfume, a biocide, bleach or an insecticide.

35 16. A method of releasing a fluent substance into a body of liquid, the method comprising the steps of: filing a perforated container with a fluent substance, the properties of the fluent substance being such that

the substance does not flow by itself through the perforations, and suspending the container in said body of liquid.

5 17. An apparatus comprising a flowing stream of a liquid contained by containment means, and a container at least partially submerged in said stream, wherein the container is at least partially filled with a fluent substance and allows contact between the substance and
10 the liquid through at least a portion of the wall of the container, and in use the fluent substance leaves the container by dissolving into the liquid.

15 18. An apparatus according to claim 17, wherein containment means is a lavatory bowl and the liquid is water.



2 / 4

FIG. 5

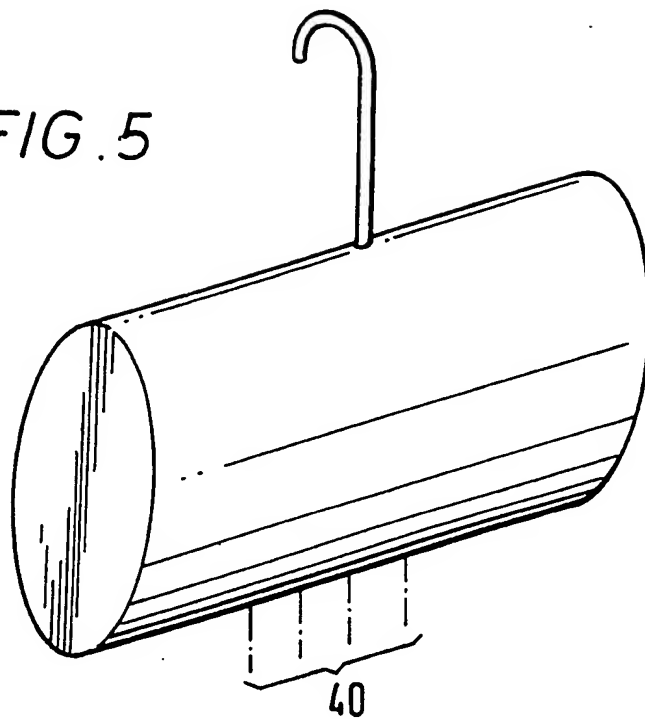
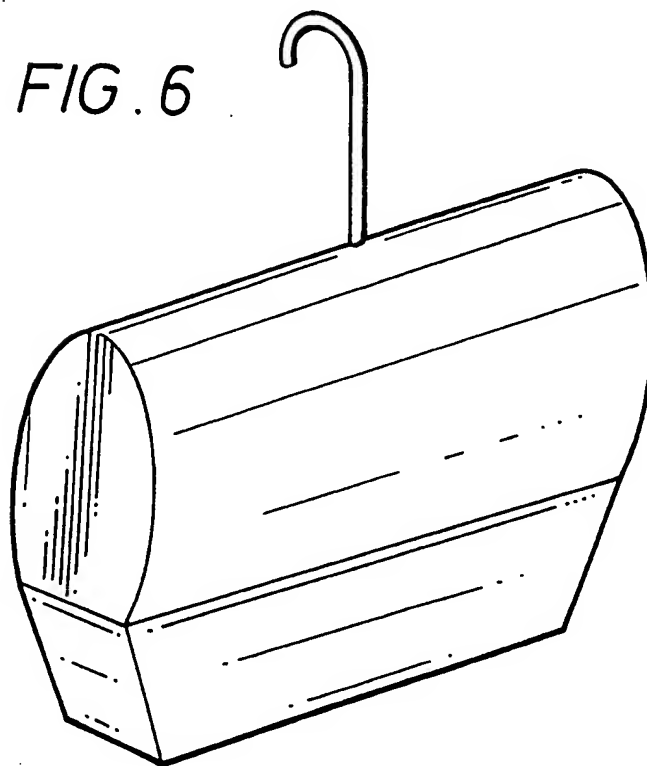


FIG. 6



3 / 4

FIG. 7

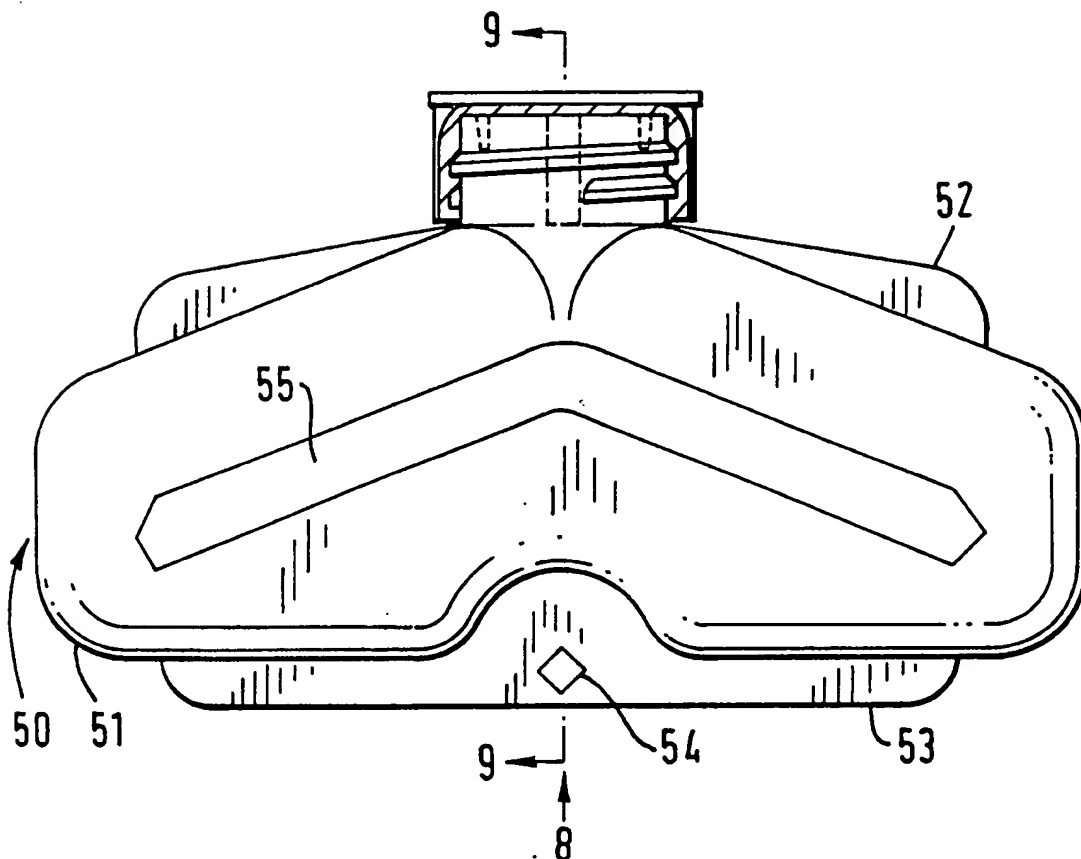
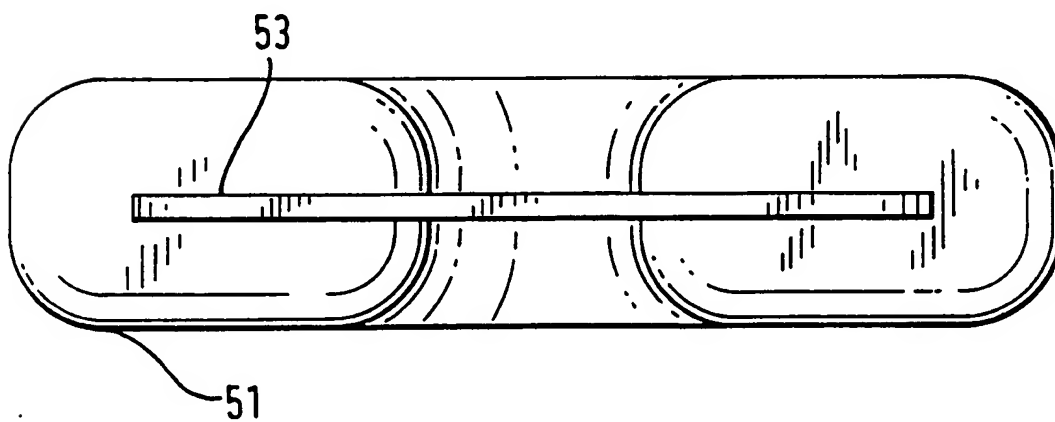


FIG. 8



4 / 4

FIG. 9

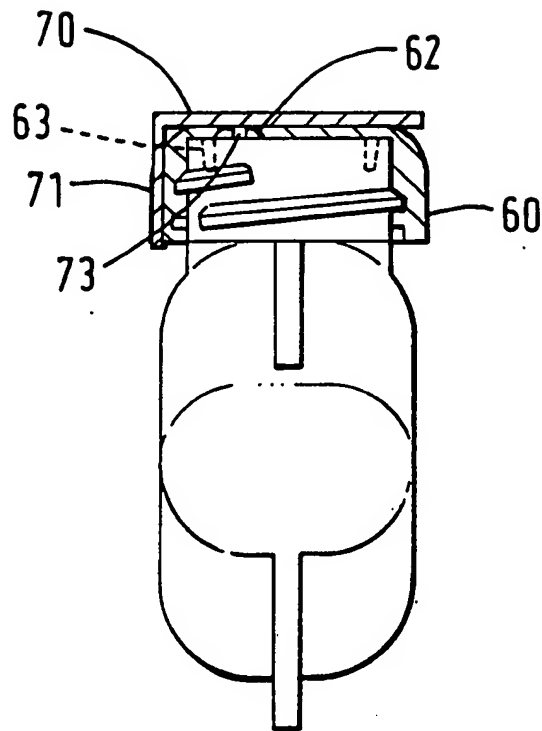
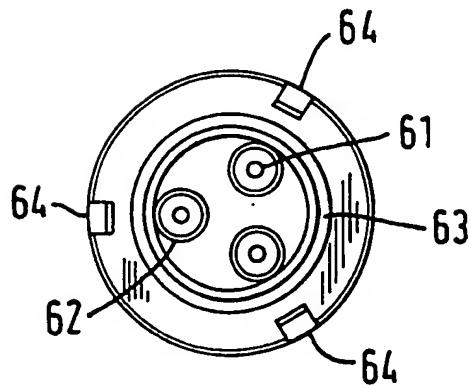


FIG. 10



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 92/00896

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 E03D9/03																										
II. FIELDS SEARCHED <div style="text-align: center; border: 1px solid black; padding: 2px; margin: 5px 0;">Minimum Documentation Searched⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border: 1px solid black; padding: 2px;">Classification System</th> <th style="border: 1px solid black; padding: 2px;">Classification Symbols</th> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Int.Cl. 5</td> <td style="border: 1px solid black; padding: 5px;">E03D</td> </tr> </table> <div style="text-align: center; border: 1px solid black; padding: 2px; margin: 5px 0;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched⁸</div>			Classification System	Classification Symbols	Int.Cl. 5	E03D																				
Classification System	Classification Symbols																									
Int.Cl. 5	E03D																									
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border: 1px solid black; padding: 2px;">Category¹⁰</th> <th style="border: 1px solid black; padding: 2px;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="border: 1px solid black; padding: 2px;">Relevant to Claim No.¹³</th> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="border: 1px solid black; padding: 5px;"> EP,A,0 270 409 (T. BAVAVEAS) 8 June 1988 see column 4, line 50 - column 5, line 4 see column 5, line 27 - column 6, line 28; figure 1 </td> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;"> 1,2,6,8, 14,15, 17,18 </td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">---</td> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">3</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="border: 1px solid black; padding: 5px;"> US,A,3 945 060 (F. GARGIONE) 23 March 1976 see column 3, line 38 - line 51; figures 3,5,6 </td> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">3</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="border: 1px solid black; padding: 5px;"> GB,A,1 053 293 (RUSSELL RESEARCH) 30 December 1966 see page 3, line 53 - line 121 </td> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;"> 1,2,6,7, 16,17,18 </td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">---</td> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">9-13</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="border: 1px solid black; padding: 5px;"> US,A,4 512 041 (TSENG TSAI) 23 April 1985 see column 3, line 24 - line 46; figures 1,5,6 </td> <td style="border: 1px solid black; text-align: center; vertical-align: top; padding: 5px;">9,10</td> </tr> <tr> <td colspan="3" style="border: 1px solid black; text-align: center; padding: 5px;">-/--</td> </tr> </table>			Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	EP,A,0 270 409 (T. BAVAVEAS) 8 June 1988 see column 4, line 50 - column 5, line 4 see column 5, line 27 - column 6, line 28; figure 1	1,2,6,8, 14,15, 17,18	Y	---	3	Y	US,A,3 945 060 (F. GARGIONE) 23 March 1976 see column 3, line 38 - line 51; figures 3,5,6	3	X	GB,A,1 053 293 (RUSSELL RESEARCH) 30 December 1966 see page 3, line 53 - line 121	1,2,6,7, 16,17,18	Y	---	9-13	Y	US,A,4 512 041 (TSENG TSAI) 23 April 1985 see column 3, line 24 - line 46; figures 1,5,6	9,10	-/--		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³																								
X	EP,A,0 270 409 (T. BAVAVEAS) 8 June 1988 see column 4, line 50 - column 5, line 4 see column 5, line 27 - column 6, line 28; figure 1	1,2,6,8, 14,15, 17,18																								
Y	---	3																								
Y	US,A,3 945 060 (F. GARGIONE) 23 March 1976 see column 3, line 38 - line 51; figures 3,5,6	3																								
X	GB,A,1 053 293 (RUSSELL RESEARCH) 30 December 1966 see page 3, line 53 - line 121	1,2,6,7, 16,17,18																								
Y	---	9-13																								
Y	US,A,4 512 041 (TSENG TSAI) 23 April 1985 see column 3, line 24 - line 46; figures 1,5,6	9,10																								
-/--																										
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p> </div> </div>																										
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border: 1px solid black; padding: 5px;"> Date of the Actual Completion of the International Search <div style="text-align: center; font-weight: bold;">22 JULY 1992</div> </td> <td style="width: 50%; border: 1px solid black; padding: 5px;"> Date of Mailing of this International Search Report <div style="text-align: center; font-weight: bold;">05.08.92</div> </td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;"> International Searching Authority <div style="text-align: center; font-weight: bold;">EUROPEAN PATENT OFFICE</div> </td> <td style="border: 1px solid black; padding: 5px;"> Signature of Authorized Officer <div style="text-align: center;">KRIEKOUKIS S. </div> </td> </tr> </table>			Date of the Actual Completion of the International Search <div style="text-align: center; font-weight: bold;">22 JULY 1992</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-weight: bold;">05.08.92</div>	International Searching Authority <div style="text-align: center; font-weight: bold;">EUROPEAN PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center;">KRIEKOUKIS S. </div>																				
Date of the Actual Completion of the International Search <div style="text-align: center; font-weight: bold;">22 JULY 1992</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-weight: bold;">05.08.92</div>																									
International Searching Authority <div style="text-align: center; font-weight: bold;">EUROPEAN PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center;">KRIEKOUKIS S. </div>																									

III. DOCUMENTS CONSIDERED TO BE RELEVANT

(CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
Y	DE,A,2 624 163 (K. MAIER) 8 December 1977 see page 9, paragraph 2; figure 3 ---	11,12
Y	US,A,3 359 063 (E. MAUDE) 19 December 1967 see column 3, line 7 - line 12; figure 4 ---	13

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9200896
SA 59488

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 22/07/92

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0270409	08-06-88	FR-A- 2606053	06-05-88
		FR-A- 2615485	25-11-88
		JP-A- 63181824	27-07-88
		US-A- 5038417	13-08-91

US-A-3945060	23-03-76	None	

GB-A-1053293		None	

US-A-4512041	23-04-85	None	

DE-A-2624163	08-12-77	None	

US-A-3359063		None	
